Roadside Park near Alpine — *Avery Johnson*

The HUMBLE WAY

MARCH-APRIL, 1950

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1949: *Year of Transition and Readjustment*

ON APRIL 14 Humble mailed 32,500 copies of its 1949 Annual Report to employees, stockholders, and others. The report pointed out that 1949 was a year of transition and readjustment following a year in which all operations were at an abnormally high level. Reduced crude oil production in Texas caused the volume of business and earnings to drop sharply in 1949. Net income for the year was $120,479,500—35 per cent less than in 1948.

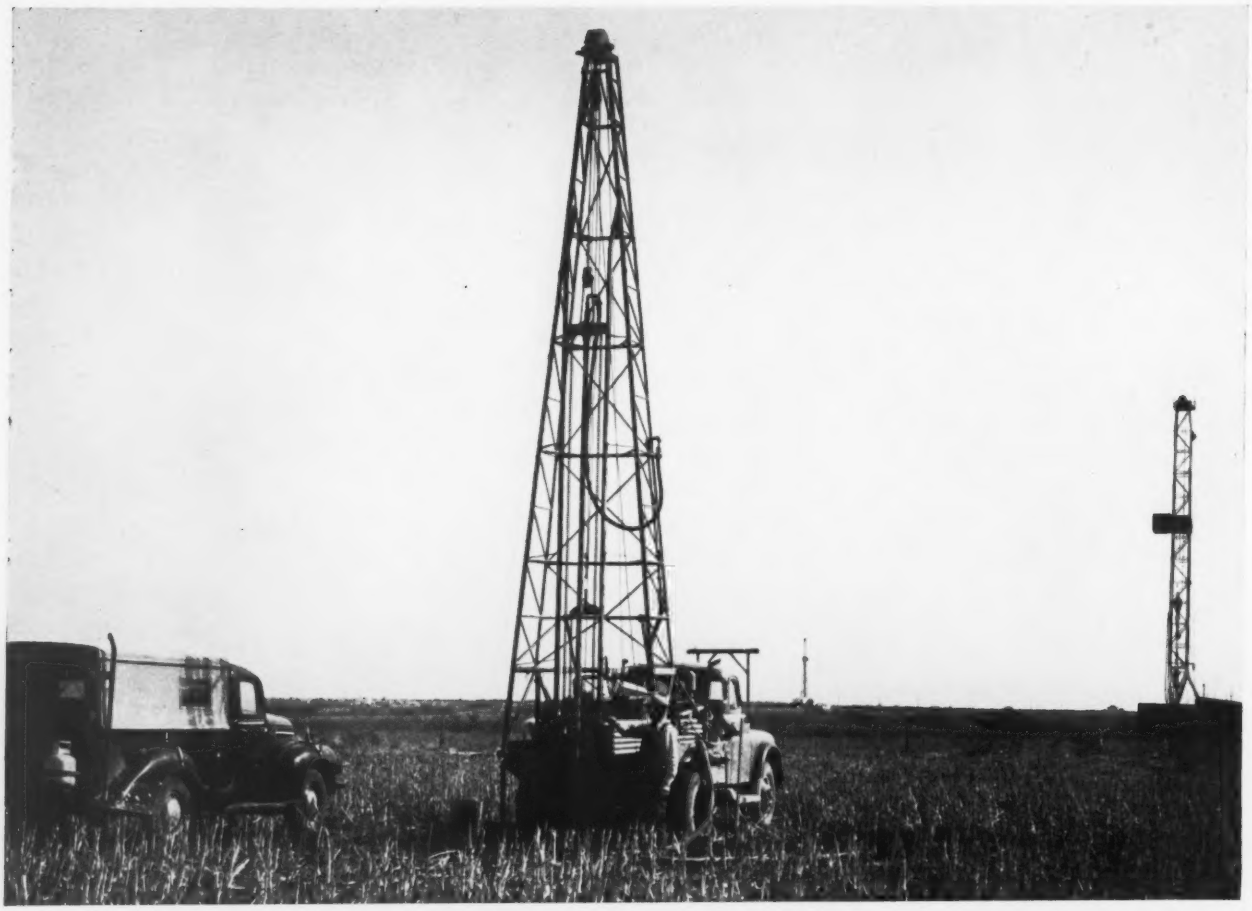
Dips in the general upward trend of Humble operations have occurred before. In fact, some sort of decline was expected for 1949; Humble anticipated that operations could not continue at the unusually high 1948 level. But the Company had not expected to bear such a disproportionate reduction in operations and income as compared with those for Texas and the oil industry generally. Oil production in the United States was cut 8.5 per cent in 1949. Texas production, which is geared to market demand in order to prevent physical waste, was cut 17 per cent in 1949 by the Texas Railroad Commission. But Humble was cut 25 per cent, because its principal production is in those Texas fields most drastically affected by the reduction in oil allowables.

A comparison with 1948 alone does not give a complete basis for understanding the precipitous drop in production and earnings during 1949. To trace the main forces that led to the decline, it is necessary to take a long-term perspective and go back to the war and immediate post-war years. Texas supplied three-fourths of the increased United States production in World War II. That was possible because the state has many fields that can be produced at high maximum efficient rates.

As it was for Texas, so it was in larger measure for Humble, for most of the Company's wells are in flowing fields. In fact, Humble's production more than doubled during the war, while that of the industry went up 28 per cent for the U. S. and 58 per cent for Texas.

At the end of the war there was a slight drop in production, but it did not last for long. There was a pent-up demand for fuel; industrial activity was expanding generally; petroleum was cheaper than coal; supplies of oil and gas were more dependable than supplies of coal. These factors soon brought about a very rapid increase in demand for petroleum. As a result, the industry and Humble had to expand production rapidly in 1947 and

Employees stroll below brightly-painted overhead lines at Humble's new natural gasoline plant at Opelousas, Louisiana. In the background are the plant's fractionator and absorber towers.



In spite of reduced income last year, Humble continued to move forward aggressively with its plans for the future. Capital expenditures were high, and the Company added to its reserves of oil and gas through increased exploratory and drilling activity. Of the 794 wells drilled during the year, 613 were completed as producers. Humble hopes to continue improving its reserves.

1948. Record capital expenditures had to be made to find and produce the oil that was needed. Finally, the inevitable peak was reached in 1948. The momentum of new development resulted in such rapid expansion of supply that the industry added materially to its stocks. In 1949, domestic production had to be reduced to balance supply with demand because demand remained constant and imports continued to increase.

The pendulum had now swung the other way. Texas production dropped more than the average for the United States, and Humble's production dropped more than the average for Texas. That is why the Company experienced such a sharp decline in business during 1949.

Leaving out the abnormal post-war years, Humble's operations in terms of production and earnings are still at a high level by comparison with any year before 1947. Even in 1949, the Company produced more than a hundred million barrels of oil.

In spite of reduced income, Humble continued to move forward aggressively with its plans for the future. Capital expenditures in 1949 amounted to $125,930,800—only slightly less than in the record year of 1948, and more than in any year prior to 1948.

Humble added to its reserves of oil and gas through increased exploratory and drilling activity in 1949. Of the 794 wells drilled during the year, 613 were completed as producers—more than in any year since 1938. In 1948, 768 wells were drilled and 600 were completed as producers. Management is encouraged by this success in finding oil and gas and hopes it can continue to improve its reserve position.

There were two other notable exceptions to the general decline in the Company's operations. Those were sales of natural gas and sales of gasoline and other products in Texas. Both increased during the year. By the end of 1949, Humble's gasoline sales in the state were approaching those of the largest marketer in Texas.

In spite of the general decline in major operations, the number of employees of the Humble Companies decreased by only 3 per cent. Total wages and salaries were slightly more than in 1948.

A great many problems have come out of changing conditions in the oil industry. But Humble seeks, as it always has with the cooperation and teamwork of all employees, to meet those problems as they arise and to face them squarely and deal with them efficiently.

New Safety Record

Accident Rate in 1949 Lowest in Company's History

The curve on one of Humble's graphs has shown a downward trend for many years — and everyone is pleased.

Last year, disabling injuries dropped to 4.61 per million hours worked—the lowest point since Humble began an organized safety program 20 years ago. That means that less than five disabling injuries occurred for every million man-hours worked throughout the Humble Companies.

Such records don't just happen, of course. Nor is the credit due to any one person or group of persons. It takes a lot of people, working together in a common cause, to make safety really mean something.

The Humble team is safety-conscious. They have the necessary tools, equipment, and protective devices for safe work. Jobs are continuously studied to make them safer; hazards are sought out and eliminated. But safe equipment and job studies cannot reduce accidents by themselves. It takes safety-consciousness and a sense of responsibility among employees to set a safety record. To Humble people, safety is more than something to think and talk about; it has become part of their job.

Unusual progress was made last year in drilling operations. Though Humble drilled more wells in 1949, there were only about half as many accidents as in 1948, and only a third as many as in 1947. Some splendid records were set by individual rigs. For example, one drilling rig in the Southwest Texas Division by the end of 1949 had completed 1606 days without a disabling injury. That is more than four years of accident-free operation in that part of oil industry work usually considered most hazardous.

Accidents were reduced 75 per cent in the Natural Gas Division and 33 per cent in the Exploration Department.

Humble's Safety Division was set up to work with the operating organizations within the Company to make jobs safer. Safety engineers work with men on the job to insure safest equipment and working conditions and to supply competent advice on job methods. Safety is promoted through regular meetings, where visual aids and practical demonstrations emphasize the safe way of doing things. Special equipment for driver and first-aid training has been assembled into mobile units which carry safety instruction throughout the Company's operations.

Humble was the first oil company in the nation to use safety hats, now used throughout the industry. It was one of the first companies to make safety shoes available to employees. A gas mask and harness, now widely used by gaugers, was designed by a Humble safety engineer.

The 1949 safety record is all the more significant because the Company's operations have steadily grown and have become more complex. New techniques, such as those required for deeper drilling and offshore operations, have called for entirely new ways of doing things and have in many instances multiplied the hazards of the job.

It is to the great credit of the Humble team that better safety scores have been made while the hazards of the game have increased. Everyone on the team has learned what it takes to do a job safely: knowledge of the job, planning, proper equipment, adequate supervision, *and a sense of individual responsibility.*

The record speaks for itself. It shows that all the effort and thinking of Humble people in the interests of safety have been worthwhile.

Much safety progress in setting the 1949 record was made in drilling operations. There were only half as many accidents in this work in 1949 as there were in 1948.

Oil Reserves Up

Scurry County, Texas, discoveries are an important factor in largest additions to U. S. reserves since 1930

THE nation's reserves of crude oil were materially increased in 1949, due principally to additions in Texas, of which Scurry County furnished an important part. The American Petroleum Institute estimates that proved crude oil reserves (oil known to be in the ground which can be produced) were 24.6 billion barrels at the end of 1949. That is an increase of 1.4 billion barrels over 1948, after production of 1.8 billion barrels during the year.

The A. P. I. estimates of proved crude oil reserves in Texas, after production of 736 million barrels last year, were up approximately 1 billion barrels to a total of 13.5 billion barrels at the end of 1949. A large part of that

Night scene, Scurry County. Lights of 37 rigs shining in the early darkness were caught by HUMBLE WAY photographer Mel Coston's lens north and west of Snyder. When picture was taken, lights of 100 rigs could be counted around horizon.

addition was in Scurry County in Central West Texas. There the development of production from the Canyon Reef limestone in the Sharon Ridge Canyon, Diamond M, Schattel, Kelley, Snyder, North Snyder, and Cogdell fields so far covers an area roughly 30 miles long and six miles wide. The fields appear to be connected, and with extensions in Borden and Kent counties the overall length of the fields will be nearly 50 miles. They are the largest discoveries in the United States since the East Texas field was found in 1930.

Up until April 1, 581 oil wells had been completed in Scurry County and at that time more than 200 drilling rigs were operating in Scurry County and adjoining Borden and Kent counties. The wells are being drilled on 40-acre spacing, and require about 30 days to complete in the limestone pay between 6,000 and 7,000 feet. Humble has wells in the Sharon Ridge Canyon field ten miles southwest of the town of Snyder and in the Schattel, North Snyder, and Cogdell fields. At present Humble has 16 producing wells, and is drilling six wells in the area.

Christmas tree of flowing well contrasts sharply with derricks and pumping units of wells in background. Of more than 400,000 oil wells in the U. S., an estimated 90 percent produce by artificial lift; pumping is the most common lifting method.

PRODUCING OIL

When natural reservoir energy wanes, artificial methods lift oil to the surface

"WHEN the oil wells run dry" has been a popular fiction since the first flush flood of oil began to dwindle in Western Pennsylvania some 75 years ago. With some alarmists, the theme has been popular right up to the present.

Only a few years ago a national magazine surveyed the effect of World War II on the nation's resources and reported some oil fields in Texas had been drained dry in supplying oil for the war effort. Some oil wells have been abandoned, it is true, but that is normal. No oil fields in Texas have been completely abandoned because of producing oil for the war. There is a very good reason for this: the oil industry has discovered how to get more oil from a field.

Since Colonel Edwin Drake's driller dipped oil by hand from the first oil well in 1859, a great many improvements have been made in getting oil out of the ground. Because of the better ways of producing oil, estimates of known oil reserves in the ground today are much larger. Today's production methods are the summation of 90 years' experience; the greatest strides have been made in the last 20 years.

Most oil wells flow when they are first completed in a producing formation. That is, the pressure deep down in the earth, either from gas or water in the oil formation, pushes the oil up to the surface so that it can be produced simply by opening a valve.

But many oil wells, like people, become old and tired; some earlier than others. When the wells cease flowing,

some artificial source of energy must be used to help the forces of nature bring the oil up.

The secret of nature's energy is in the pressure of the gas and water which were squeezed into the pores of the reservoir rock along with the oil millions of years ago. Usually, this pressure is approximately equal to the weight of a column of salt water from the surface down to the oil formation. By restricting flow in such a way that a minimum amount of oil is by-passed in the reservoir rock, oil men found they could produce more oil in the long run.

The benefits of holding production to a fraction of the wide-open flow of a well came as a surprise quite a number of years ago to some operators in a Wyoming field. Faced with a shortage of transportation to carry their oil to market, they prorated their production to share in the transportation facilities. Later, they found their wells flowed longer and produced more oil than was usually expected.

That was the forerunner of modern reservoir practices. Today a "maximum efficient rate" is calculated to establish the highest sustained production rate of a field without waste. Much of the progress in oil production technology has been in knowledge of reservoirs and how they operate.

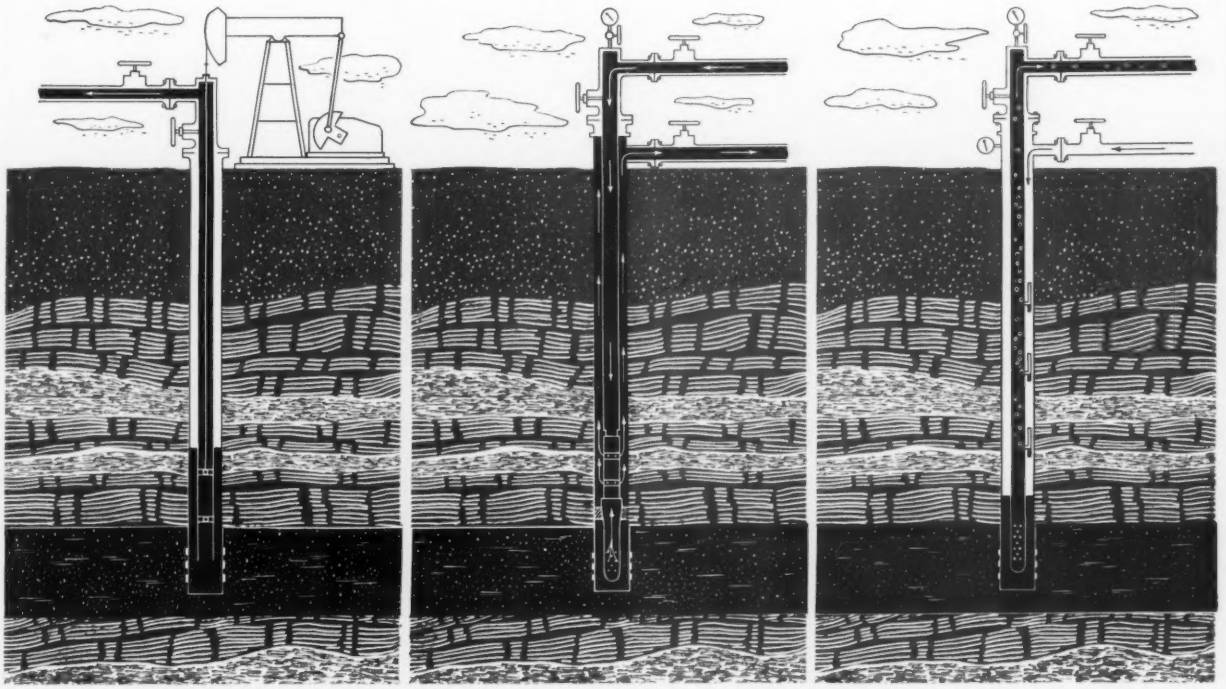
Engineers and research men turned to considering how and why an oil reservoir produces oil, which led to operating the reservoir *as a whole*. Rather than thinking solely about individual wells, the future performance of an entire reservoir can be predicted, and the production of each well regulated as a part of the whole reservoir.

Early in the development of a field, engineers begin investigating ways of getting the most oil possible from each reservoir and prolonging the flowing life of the wells. They study the reservoir to determine as clearly as possible what drives the oil from the reservoir and how production can best be managed.

When reservoirs need artificial energy, the flowing life of wells can be prolonged by maintaining the reservoir pressure by injection of gas or water. Pressure maintenance works on a reservoir or field basis, thus avoiding expensive installations at individual wells. Such methods prevent rapid depletion of reservoir pressure and more oil recovery is the result. The idea originated, though without the theory, with some pumpers in Pennsylvania in 1869. They discovered that water which leaked down into the oil reservoir rock boosted the production of nearby oil wells.

In the East Texas field, the world's largest water pressure maintenance project has been in operation since 1939. More than 1.3 billion barrels

THREE ARTIFICIAL LIFT METHODS



Plunger pump operated by "sucker rods" from pumping unit on surface lifts oil with each up-and-down stroke. Beam pumping unit is most common type.

Hydraulic pump uses "power oil" (top) forced down to hydraulic pump unit at bottom of well, which pumps oil to surface through well casing.

Gas lift raises oil to surface by bubbling gas up through tubing from gas lift valves. Gas lightens the oil column so that reservoir pressure pushes oil up.

Hydraulic pumping unit for rod-plunger pumps has high production rate made possible by 20-foot stroke of the unit.

of salt water produced with the oil have been pumped back into the Woodbine producing sand. The reservoir pressure has been kept almost constant while producing more than 1.4 billion barrels of oil.

The importance of the East Texas project is difficult to estimate. Producing rates of wells were kept up, and the field made a major contribution to the oil needed for World War II and the high civilian demand since. Without the maintenance of pressure, it would have been necessary to reduce production during the critical war years or risk damage to the reservoir.

When gas is used to maintain the reservoir pressure, the oil wells are kept flowing and the gas is conserved for future use. That is the case in the Lovell Lake field near Beaumont, Texas, where Humble operates a compressor plant to pump gas back into the reservoir.

Where production by natural drive has already dropped very low, operators may resort to secondary recovery methods, such as flushing a reservoir with gas or water. By this means, oil is often recovered that could not otherwise be produced.

Sooner or later in the life of most oil fields, many or all of the wells cease to flow. This may come as the reservoir pressure declines or as the amount of water produced with the oil increases. When flow stops, some means of artificially lifting the oil must be used. Surveys indicate an estimated 20,000 wells will be placed on artificial lift this year. An estimated 90 per cent of the more-than-400,000 oil wells in the United States produce by some kind of artificial lift.

There are two principal types of artificial lift: pumping and gas lift. The nature and depth of the reservoir often determines the type selected for a given field, although economic factors are also considered. For flowing fields, the cost of producing oil may be only a few cents a barrel; where oil is artificially lifted, the cost of producing the oil is higher, and may be as much as the selling price of the oil.

Pumping is the more common method of lifting oil, especially where the reservoir pressure declines rapidly. Since the pumps may be powered by electric motors or internal combustion engines, they may be used almost anywhere.

From the first, simple plunger pumps, operated with an up-and-down motion from a pumping unit at the surface, have been used in oil wells. In early wells wooden rods were used to transmit power, but they were soon replaced by steel ones. Today, sucker rods are of special steel and designed to endure the stresses of millions of strokes of the pump.

Most rod-pumping units today are the familiar bobbing "beam" type, an off-spring of the cable tool walking beam. When a well was drilled in with the wooden cable tool rig, the derrick and rig were often left intact for pumping, since the flowing life of a well was short in those days. In the past 20 years, most wells have been drilled with portable rigs which are moved off after a well is completed, leaving only the Christmas tree of a flowing well. If the well is completed as a pumper, the pumping unit is installed as soon as the rig is moved.

The rod-type pump has been widely used for pumping wells of shallow depth. However, as the depth from which the oil must be lifted increases, the power requirements and frequency of sucker rod breakage reduce the operating efficiencies so much that the cost of operation becomes prohibitive. Also, sucker rods are difficult to use in crooked holes.

In order to overcome the shortcomings of the rod pump and to increase the efficiency of pumping under special conditions, many other types of pumps have been developed. A hydraulic pump has proved useful for pumping deep wells. A surface unit forces oil down to operate the pump in the well, after which the power oil returns to the surface with the produced oil. The surface pump uses some of the produced oil again, then, to operate the pump in the well. Also in use is an electric centrifugal pump that can be lowered into the hole and powered through a cable from the surface. It is designed primarily for delivering large volumes of fluid to the surface from relatively shallow depths.

Where enough gas is available, gas lift may be installed. A common practice is to put gas into the well casing so that it can enter the oil column in the tubing through the gas lift valves. The gas bubbles up through the oil, lightens the column, and the oil flows. Gas lift is especially useful in handling large volumes of fluid. Individual well gas lift installations are usually much less expensive than pumps, and require little maintenance.

Present-day gas lift methods grew from the use of compressed air for lifting water as early as 1846; oil was produced by air lift in 1864. Around the turn of the century air lift was used in many Texas and Louisiana fields, but by 1923 had been generally replaced by gas lift.

Industry statistics show that in the United States 57 wells are abandoned and 58 are placed on artificial lift for every 100 new producers brought in. Such figures reflect the oil industry's efforts in meeting the demand for oil. Each new well produces many times more oil per day than the old one which is abandoned, and those placed on artificial lift will be operated for maximum ultimate production. Thus, the reservoir studies and production practices used today insure a longer life for existing and future oil fields, and more oil for the American public.

Derricks and beam pumping units are familiar to most oil fields, such as these on the plains of West Texas. Pumping derrick for servicing pump is erected after well is completed.

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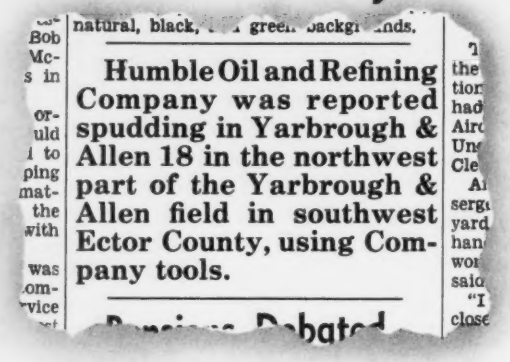
Spudding in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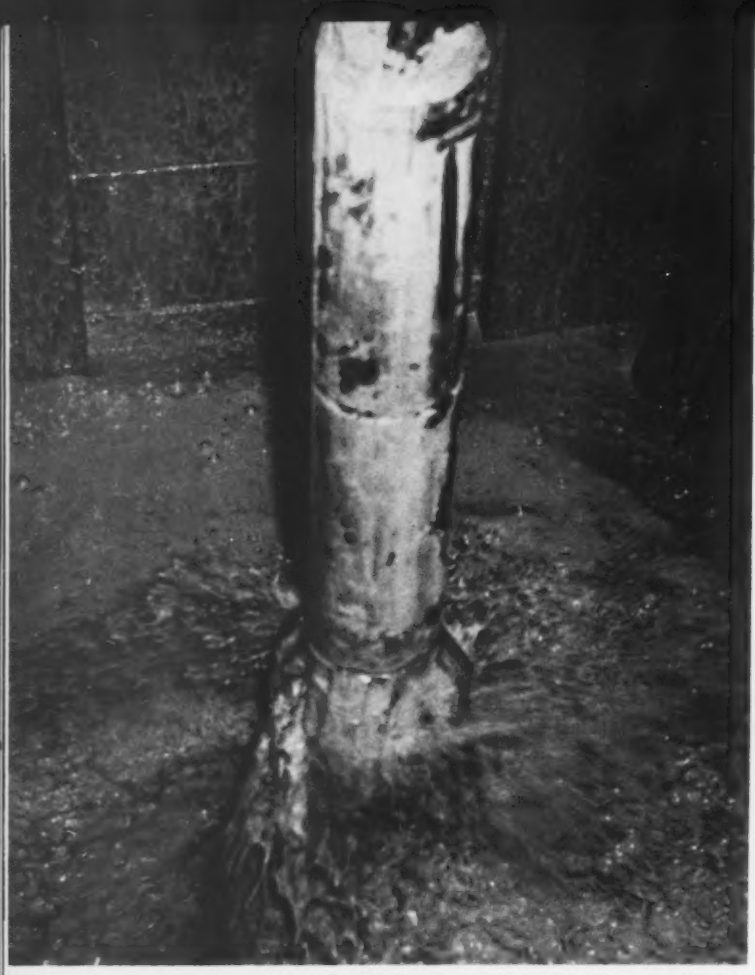
Humble Oil and Refining Company was reported spudding in Yarbrough & Allen 18 in the northwest part of the Yarbrough & Allen field in southwest Ector County, using Company tools.

An air of suspense surrounds a drilling rig when things are being made ready for drilling a well. The crew feels the urge to get started drilling, and each man does his job with precision. The driller's voice is crisp, and the tool pusher is around but tactfully quiet as rigging up proceeds.

The superintendent manages a casual visit and veils a question, "When'll you get'er spudded?" The reply is usually a guess packed with hope and padded with time for the delays which nearly always occur.

Tension builds up as time goes on, boosted by a clutch that doesn't fit just right, or a mud pump that develops a knock. Carefully and deliberately the adjustments are made. Mealtime often goes unnoticed for an hour or more until the heartiest of appetites overcomes the zeal to get the job done.

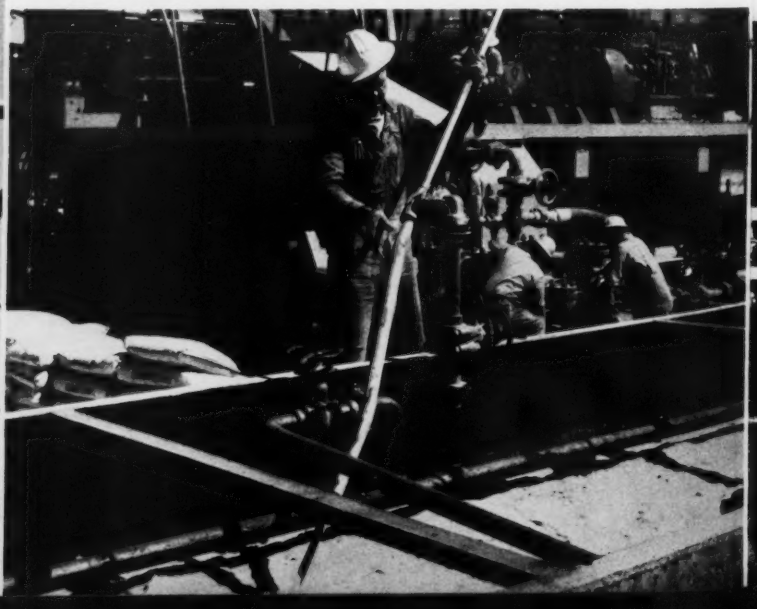
There isn't time to set up everything before drilling begins. The drilling lines must be strung in the derrick, and the drawworks, engines, and the mud system must be ready. There's time to put up the windbreaks and hook up the smaller units while drilling the 80 to 300 feet of surface hole. And, there's time while waiting 24 hours for the cement to set around the surface casing which seals off shallow water sands.



At exact moment of spudding in— when the bit starts digging —squirting mud leaves a spiral wake on surface of cellar floor.

Sacks of bentonite (clay) are poured into the mud-mixing machine; 200 barrels of drilling mud are mixed to start the hole.

Crewman stirs mud in tank by directing stream from mud gun. Beyond, other men work on mud pump and rig's Diesel engines.



Kelly with bit on lower end is deflected from center of derrick for drilling the "mouse hole"—where a joint of drill pipe is kept before it is added to the drill string. Rock bit is standard for drilling the extremely hard formations encountered in the West Texas area.

Spudding in is number one in everyone's mind.

Things are nearly ready when the rotary is blocked up on one side of the derrick floor for drilling the "rat hole"—the hole where the *kelly** is placed when not in use. The crew mixes a tank of drilling mud, and when there is enough, a check of the engines, mud pumps, and the setup is made. If all is ready, drilling the "rat hole" begins.

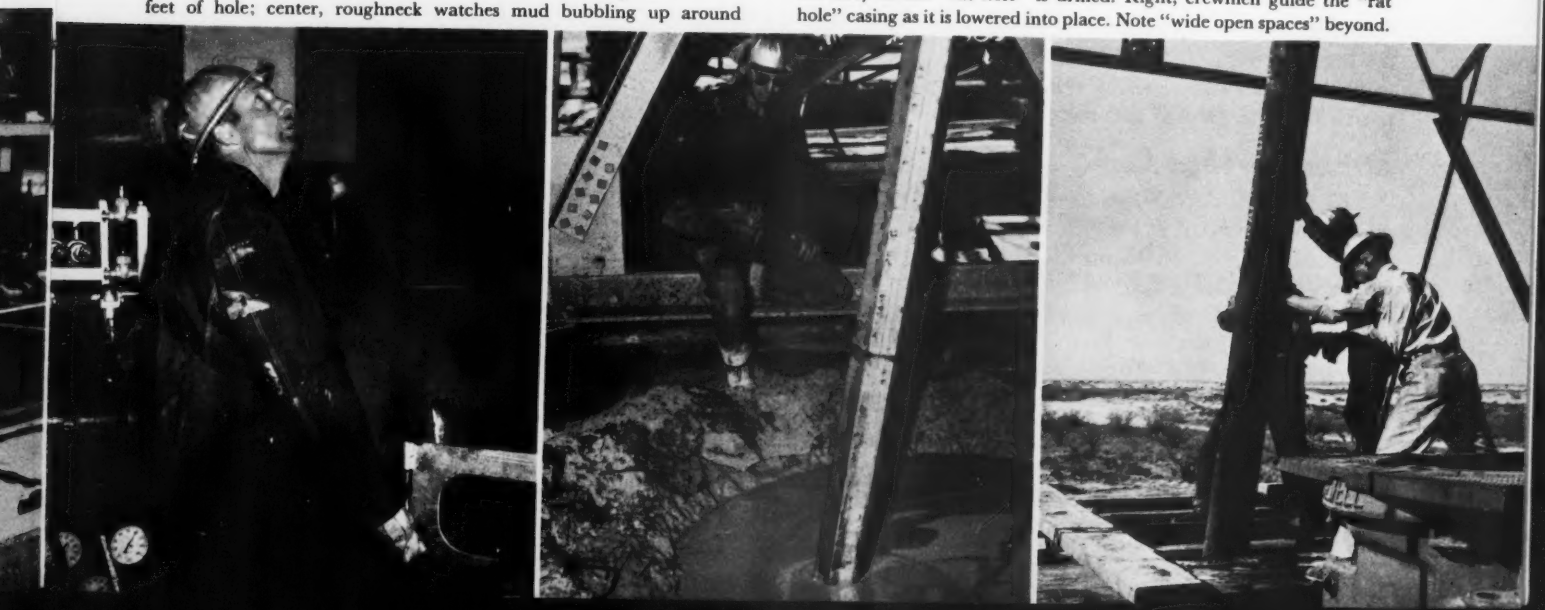
The mud pump is started, the driller slacks off on the brake and starts the rotary turning. The high-velocity streams of mud jet away the surface sand as the kelly turns, so that the cutters on the rock bit seem unnecessary. Only about 28 feet is drilled for the hole in which the casing sheath for the kelly is placed. The top is 12 feet higher on the derrick floor.

Before the well is spudded, the "mouse hole" must also be drilled. Just as you would think, the "mouse hole" is little brother to the "rat hole." It is the hole beside the rotary where a joint of pipe is placed for screwing it into the drill string. Usually the kelly can be turned by hand, and the "mouse hole" drilled by the jet action of the mud.

When the mouse hole casing has been set in place, only the positioning of the rotary in the center of the derrick floor and connecting the rotary drive chain remains to be done. Then, when everything is in readi-

*—The *kelly* is the square or hexagonal-shaped section of pipe which transmits the rotary motion to the drill string. The kelly is the uppermost section of the drill string.

Driller watches traveling block descend while drilling the first 30 feet of hole; center, roughneck watches mud bubbling up around the kelly as the "rat hole" is drilled. Right, crewmen guide the "rat hole" casing as it is lowered into place. Note "wide open spaces" beyond.



Derrick of Rig 42, which has weathered hurricane winds off the coast of Louisiana, now towers above the desert-like sand hills in the Yarbrough & Allen field in West Texas. Crewmen work with the kelly at an angle drilling the "mouse hole" before spudding in.

ness, the tool pusher gives the word: "Turn'er to the right!"

The moment has arrived. The driller slacks off on the brake and starts the rotary turning. The kelly, turned by the rotary, twists downward out of the driller's sight. Below the derrick floor the bit on the lower end of the kelly squirts mud, leaving a spiral wake on the surface of the mud in the cellar.

Almost as soon as the cutters on the bit disappear, they scrape the edges of the hole jetted out by the mud. Later bits will find the digging much rougher, but the first one has "scratched" the surface, and has started "making hole." The well is spudded, bringing nearer the proof of the geologists' belief that oil lies below.

The driller's report reads: "Finished rigging up and spudded in . . . Drilled 260 feet . . . "

Drilling Ahead

The pictures on the two foregoing pages were made when Humble's Rig 42 finished rigging up and spudded Yarbrough and Allen 18 on the northwest edge of the Yarbrough & Allen field in Southwest Ector County, West Texas. The field is north of Highway 80, ten miles east of Monahans. Five miles north of the highway past the typical scrub mesquite and sparse grass, Rig 42 stands on a caliche square in the midst of large sand dunes.

This is the first Company rig to operate in West Texas since 1943, and both men and equipment came from widely scattered places. Crewmen volunteered to transfer from places like Grand Isle and Paradis, Louisiana, from Southwest and East Texas, and from the Gulf Coast.

The derrick and drawworks had been used to drill a well in the Gulf off the Louisiana coast, the mud pumps are from Galveston Bay, and the three 200-barrel mud tanks were shipped from near Corpus Christi. The motor generators came from a crane on an offshore LST.

The rig is equipped with many air and electric devices to make it one of the most modern in West Texas. Humble-developed walking brakes are on the drawworks for better drilling control, and compressed air operates the slips, brakes, and lubricators.

Water for drilling is a problem, as it is on almost every location in West Texas. Rig 42 gets water from a well seven miles away, supplied by a natural siphon. Yarbrough & Allen 18 is scheduled for a total depth of 10,800 feet, or the field's producing formation near that depth.

WEST TEXAS

. . . . Land of Contrasts

To portray some of the beauty that abounds along Texas highways through eyes not accustomed to this beauty, THE HUMBLE WAY last year commissioned New Jersey artist Avery Johnson. Late in the summer he traveled more than 3,000 miles by automobile, observing, admiring, sketching Texas scenery.

On the cover and on the next two pages are presented the first two in a group of his regional paintings—both done in the area of West Texas shown on the accompanying map.

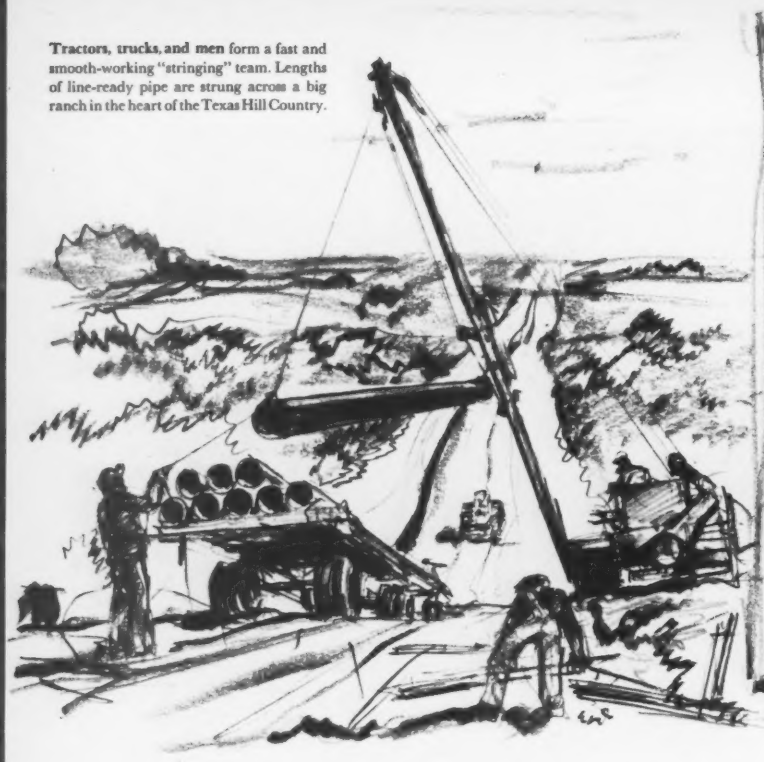
"As an artist," Johnson writes, "I was struck with the magnificent scale of everything: the green areas as lush as could be imagined; the limitless space and spectacular sunsets of the mesa country; the rocky ruggedness of the mountains in the Alpine area. As a motorist I was impressed with the excellent engineering of Texas highways . . . it was pure joy to roll along mile after mile . . ."

Of the painting on the next two pages, Johnson says, "I tried to get some of the feeling of vast space, rich, warm colors dotted with desert vegetation, and the invitingly open quality of the highway."

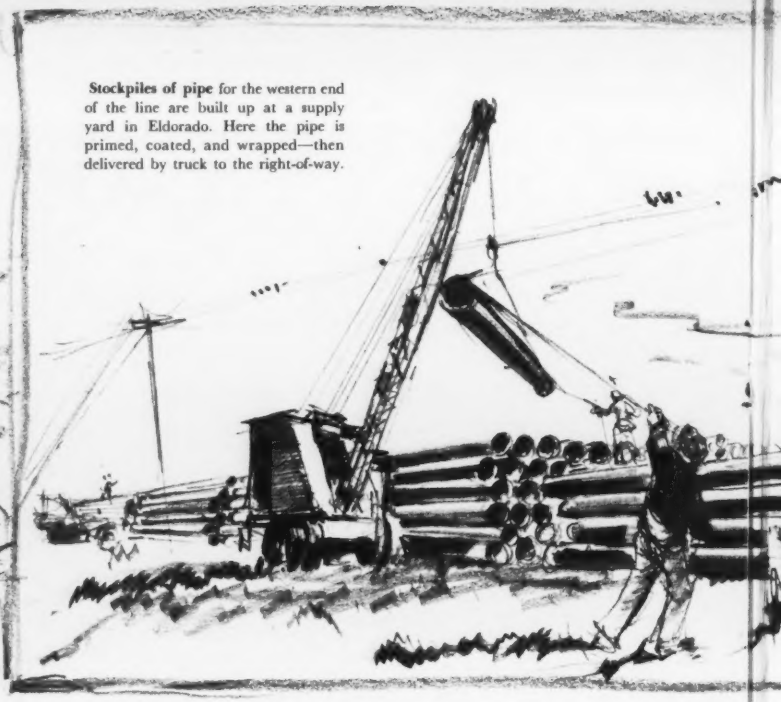
More of Johnson's paintings will appear in future issues.

U. S. 290 near Bakersfield, Texas

Avery Johnson



Tractors, trucks, and men form a fast and smooth-working "stringing" team. Lengths of line-ready pipe are strung across a big ranch in the heart of the Texas Hill Country.

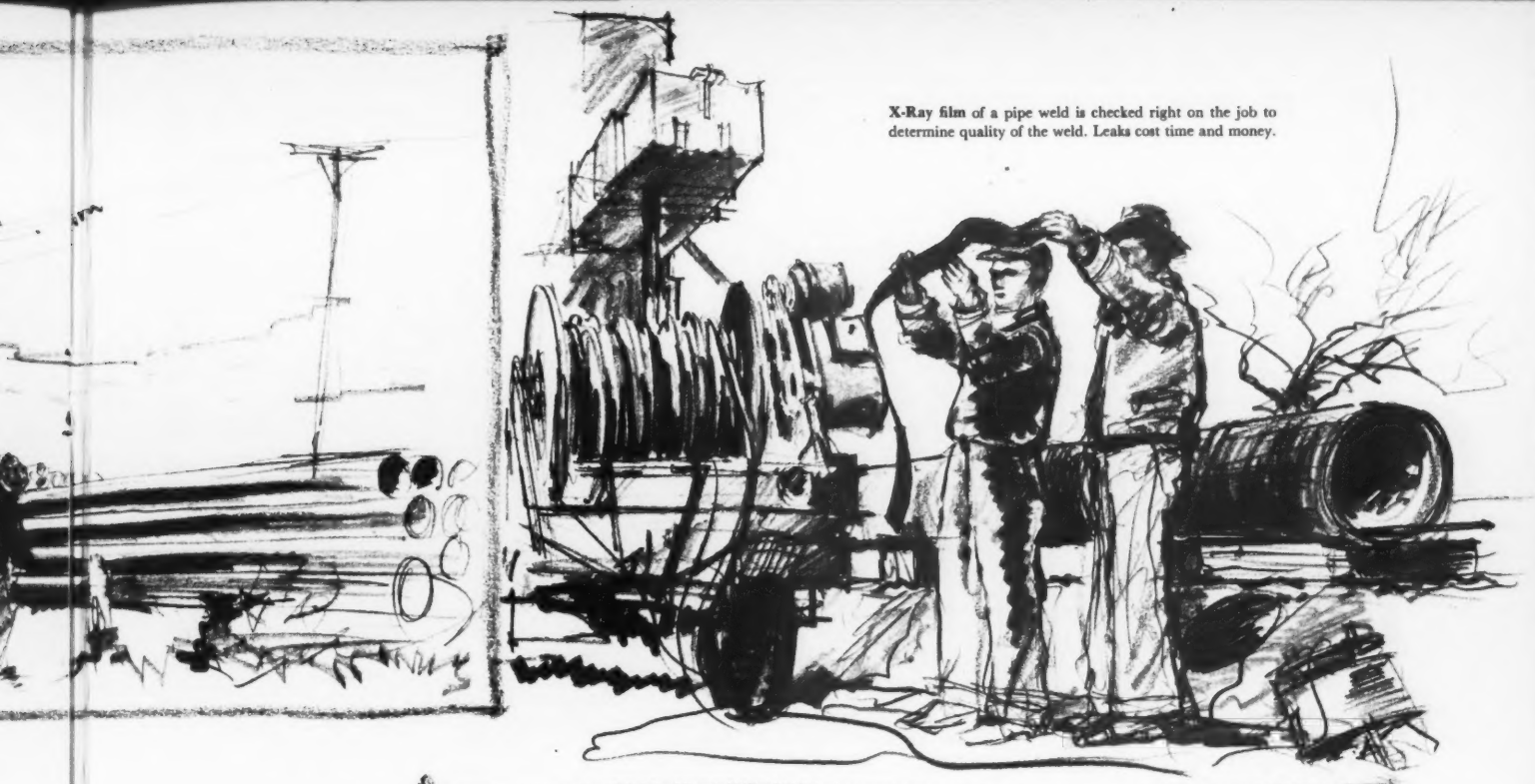


Stockpiles of pipe for the western end of the line are built up at a supply yard in Eldorado. Here the pipe is primed, coated, and wrapped—then delivered by truck to the right-of-way.

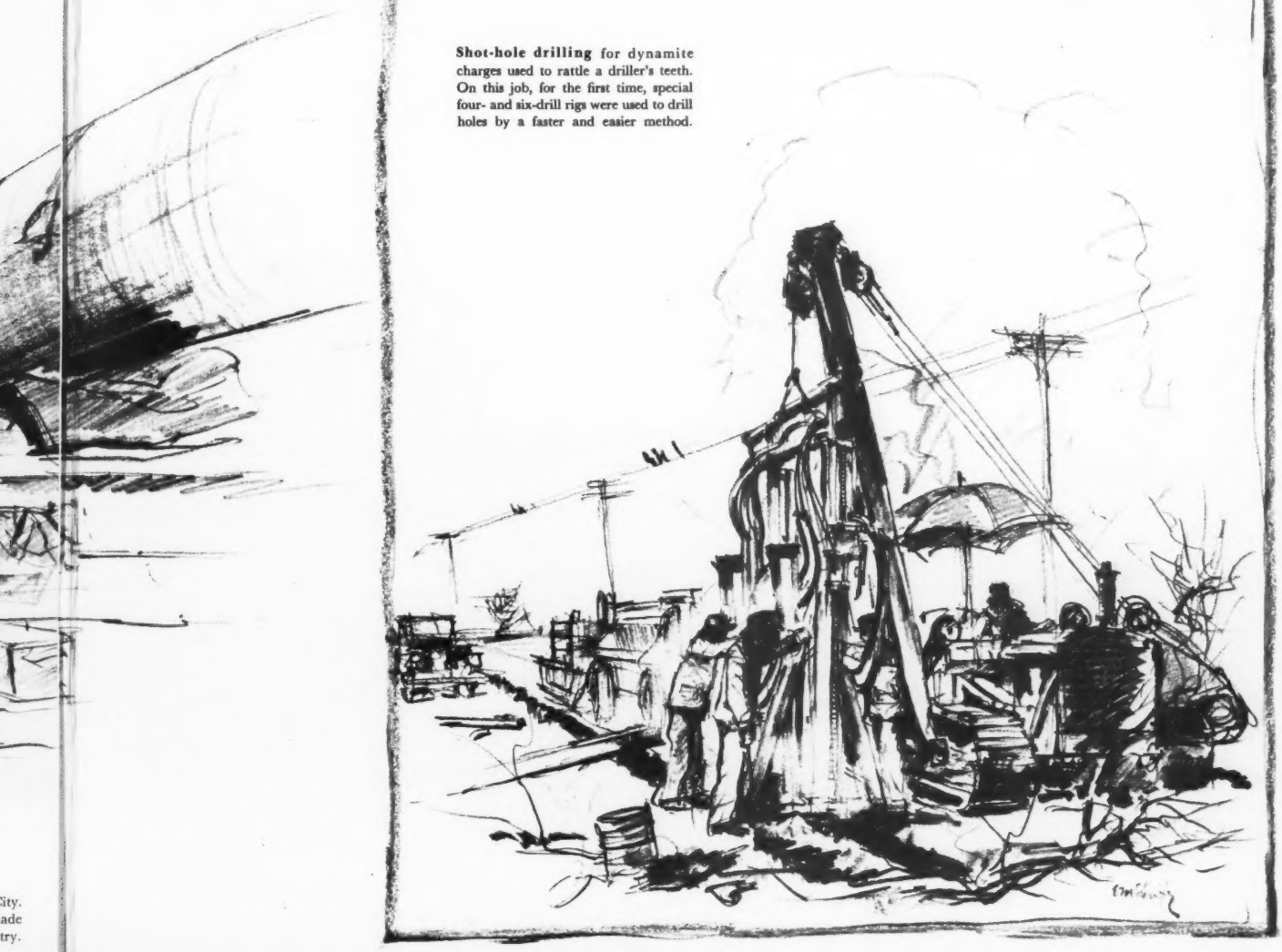
BUILDING A LINE—*From an Artist's Sketchpad*

by E. M. Schiwetz

Crossing the Pedernales River near Johnson City. Flinty rocks and steep banks at this crossing made pipeliners long for easier going in flat country.



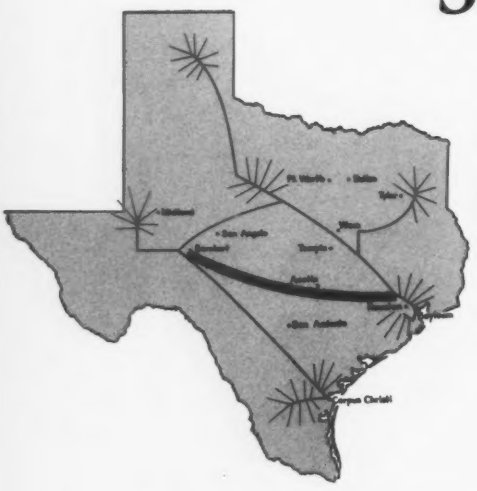
X-Ray film of a pipe weld is checked right on the job to determine quality of the weld. Leaks cost time and money.



Shot-hole drilling for dynamite charges used to rattle a driller's teeth. On this job, for the first time, special four- and six-drill rigs were used to drill holes by a faster and easier method.

Pipe is propped up on rocky hillside for final inspection before it is laid in ditch by slings on sideboom tractors. Welded joints in line beside the truck nearest camera are being X-Rayed to detect possible welding flaws not visible to the eye.

Short Cut from West Texas



Direct 370-mile artery connects major West Texas producing area to tidewater at Baytown.

New 18-inch pipe line to shorten route by 52 miles, cut costs, and speed deliveries

In the transportation business, miles cost money. Acting on the geometric truth that a straight line is the shortest distance between two points, Humble Pipe Line Company is building a new 18-inch line that follows a direct 370-mile route from Kemper, near Big Lake, to Satsuma, near Houston. The line, which is expected to be ready for service in June, will cut 52 miles off the old route. With three pump stations, it can deliver a maximum of 135,000 barrels of oil a day, nearly three times as much as the old system.

In the past, oil has been moved by Humble from West Texas to the

Gulf Coast through a system of small lines that "just grew" as new fields were discovered and more oil was produced. The first of these was an 8-inch line that started at Kemper and tied in to the existing north-south line at Comyn, in north-central Texas. On this first line, three pump stations were built about 45 miles apart. Later, as West Texas began to produce more oil, a second 8-inch line was laid parallel to the first, and four intermediate pump stations were added to increase capacity.

The way the system had grown led to inefficiency and top-heavy operating costs. In the face of these rising costs, increased postwar competition, and the need for additional capacity, a change was definitely in order. The new line will reduce operating costs and place Humble in a better competitive position among other carriers by having: (1) a shorter route—52 miles less than the old system, (2) larger pipe to carry more oil, and (3) fewer pump stations.

The line is being built in two sections, with one working spread in the western section and two in the eastern section. Supplied from different bases, the three spreads are all working at the same time, and the sections of line will grow until they are finally joined. Nature and the weather haven't cooperated too well in some places and at some times, but the job is still a neat piece of logistics—which military men define as getting the right things to the right place at the right time.

Trainload of pipe (4½ miles) and machinery pulls into yards at Barnhart, where 50 miles of pipe were made up into 80-foot sections and tar-coated.

Several new engineering wrinkles are being used on this job. Pipe to be laid across rivers is coated with a thick layer of special cement that is unusually heavy. Thus coated and weighted, pipe is not likely to stir from its bed below the river. Another innovation is the use of special four- and six-unit gang drill rigs to drill shot holes for explosive charges. In the past, these have been dug by air-drills with from one to two bits that rattle the teeth of those who operate them. At the western end of the line, 80-foot sections of pipe are used, made by welding together two 40-foot sections. As a modern touch, shortwave radio-telephones are installed to keep field offices in touch with the working crews at all times. If visitors have to be directed to the job, if a man is hurt on the job and has to be carried in for medical attention, or if supplies and spare parts are needed in a hurry, the radio-telephones take care of the matter in short order.

The finished line is going to have something new, too. When placed in operation, it will be among the first pipe lines to use a microwave radio communications system. Simply speaking, microwave radio is a telephone system *without wires*. Messages sent by dispatchers will be beamed across country through a series of "repeater" stations. Each station will pick up the message and transmit it to the next until the man for whom the message is intended takes it over a regular telephone receiver. This will be a body blow at Old Man Winter. Ice storms, which have disrupted communications in the past, will hold no terrors for those who operate this line. There simply won't be any lines or poles to break down.

It is not too difficult to get the economic significance, or the construction details, of a new pipe line. One can do that comfortably and at long range, from an office. But the only way to understand what it takes

Automatic arc-welding machines joined 40-foot pipe sections into 80-foot "doubles" in yards at Barnhart and Eldorado.

to build a line is to go out and watch it being built. That is the shortest cut to a healthy respect for the pipeliners, too. For they are men who cannot follow the path of least resistance. They follow a prescribed route, which sometimes takes them where a mountain goat must walk warily. Over precipices, into deep ravines, across rivers, through marshes—the pipe must go on. On this job, one veteran with 30 years of pipelining under his belt declared, "I've been in this business all my life, but there was 15,000 feet of solid rock on this spread that beat anything I've ever seen! We had a real man-size job on our hands. After this, it'll be a relief to get down to a soft, flat prairie!"

Like all good pipelining jobs, this one is typified by teamwork, rough but friendly banter, and pride of workmanship. One man spoke admiringly of the pipe-bender, who works right on the job, as the pipe is being strung along the right-of-way: "That fellow beats me. Never takes a minute or uses a slide rule to figure degrees and angles. He just plays that pipe-bending machine by ear, and he's missed only once that I know of. Good? You bet he's good!"

Truck drivers who haul strings of pipe from supply depots have their share of color, too. One was described by his mates as "Always cussin' a blue streak and racing his motor wide open." The fellow roared in with a load of pipe, and lived up to his billing. He exploded when a caterpillar tractor nosed alongside to take his truck down a steep, rocky incline:

"Get that mangy cat out of here," he bawled. "I helped build the Ledo Road in Burma and the Alcan Highway. When I can't take old Betsy down *this* kinda hill, I'll join the Ladies' Aid." Shifting his cud of Tinsley to the other jaw, he clattered down the steep grade, scattering rocks and kicking up a cloud of dust as he went. He took her down and he brought her back, giving the "cat" operator an aggrieved look as he took off for another load.

A stranger seeing the line-crossing at the Pedernales River, near Johnson City in the Texas hill country, might have called the scene "impressive." It is quite likely that the pipeliners had other, and stronger, adjectives of their own for that particular project. Steep hills on either side, and the river bed itself, are nothing but solid rock at that point.

The line slithered down one steep bank, was propped up on wooden stilts in the rocky, shallow, swift-flowing stream, and disappeared over the ridge on the other side. Welding torches flickered as welders put stringer beads on lengths of pipe to hold them together until a complete weld could be made. Sideboom "cats" crunched up and down the rocky banks on some mission or other.

Late in the afternoon, when everything was going well, a joint of pipe "dropped a stringer bead" and repairs had to be made. This done, the clutch went out on a key tractor in the middle of the river. The foreman appraised the situation, and decided it was enough for one day.

"Close her up, boys," he instructed, philosophically. "We'll get the clutch fixed tonight and crank up again in the morning."

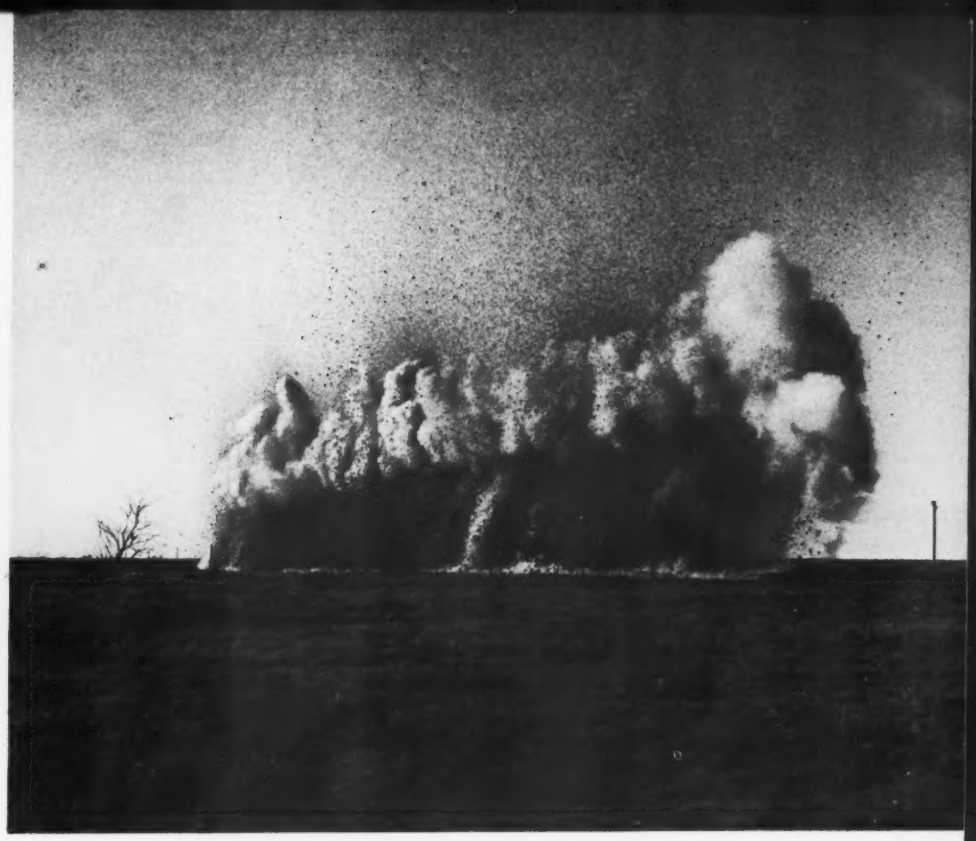
That's the way it goes in the pipelining business. Sometimes, when your luck goes bad late in the day, it's best to "close her down and crank up again in the morning." But you can't stop for long; the line has got to be kept moving.

To the men who build them, pipe lines are more than so many inches on a map or a blueprint. They are memories of miles and months of blasting through solid rock, slogging through mud, crossing rivers, and machines breaking down. They are memories of days and weeks of battling Nature in her most resisting forms, and endless bouts with the furious weather's rages. It's work where both machines and men have to be rugged, to stand the gaff. But, at the end of the line, there's the satisfaction of a job well done.

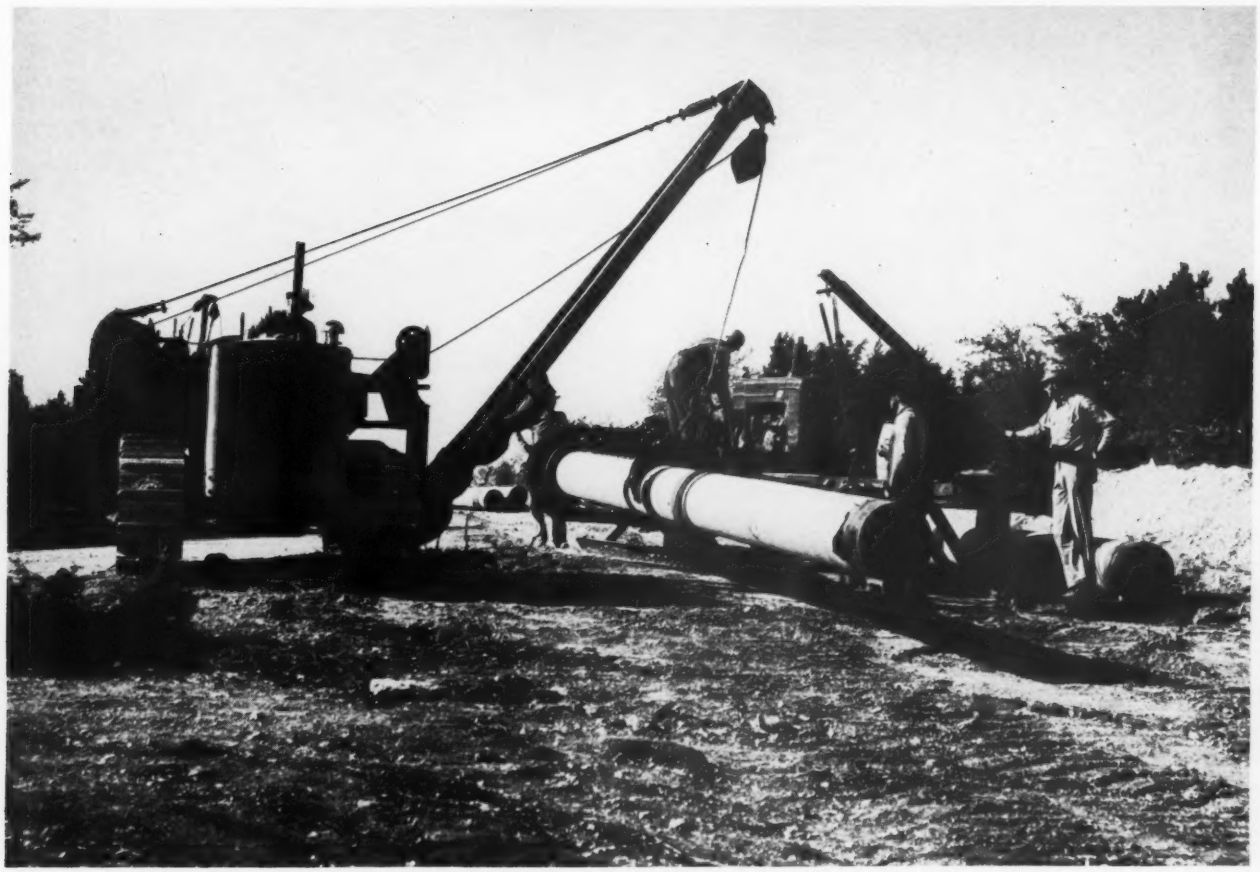
Soon only a clean bare scar will stretch thinly across the hills and plains of Texas to mark the pipe line's resting place. In time, even the treadmarks of the "cats" will disappear. Throbbing through the line, thousands of barrels of West Texas oil will take the 370-mile "straight shot" journey to the Gulf Coast to be refined there or loaded aboard tankers for movement to distant refineries.

THE SEARCH FOR OIL GOES ON

Geologists leave no stone unturned in their constant search for oil. Two division field geologists have followed the ditch of the new pipe line since construction began late last year, studying and mapping formations and bagging samples for further laboratory analysis.



Dynamite sticks, placed in shot holes along the line, produced the thunderous "fireworks" at right. Blast is a fifth of a mile long. Chunks of rock as big as cookstoves were flung high into the air as ditch was blasted for the pipe.



Pipe-bending machine, sideboom "cat," and ability born of long experience combine to put the proper bend in a length of pipe. Pipe for this line was bent quickly and accurately, right on the job, to fit the rise and fall of the rugged Texas hills.

For Safer Driving

Mobile driver education unit stands parked in a Humble field community. By means of this trailer Humble will carry its driver training program to all company locations not accessible to one of five semi-permanent driver training centers.

Mobile Driver Education Unit Is Latest Addition to Humble's Safety Program. Instruction Available to Company Drivers.

ARE YOU a safe driver?

Few of us have the opportunity to find out how well we drive or to get expert advice on becoming safer drivers. But every employee who has occasion to drive a Humble vehicle will soon get the chance to evaluate his own driving, and to learn to be a better driver.

Five semi-permanent driver training centers have been set up by the Humble Companies in Houston, Baytown, San Antonio, and at the Waco and Irving products terminals. In addition, the mobile unit shown on these pages is visiting field locations to extend the training throughout Humble operations.

Twenty-six trained Company instructors operate modern, specially built equipment to make the training of real value to each driver.

Training is conducted in three phases. The first consists of a written examination on traffic laws, safe driving practices, and certain mechanical phases of vehicle operation.

During the second phase drivers are able to check on their vision and their quickness of reaction in an emergency. Each driver finds out how well he can see and the extent he can see to each side when looking straight ahead. His ability to judge distances of oncoming cars is measured by the depth perception device, while a color sample book tests his ability to distinguish colors. Steadiness and length of time required to see clearly after looking at bright headlights are measured. Finally, reaction time to flashing arrows or stop lights is recorded on the reaction timer.

In the third phase of the program the employee checks up on his skill while driving the kind of vehicle he normally drives over an obstacle course, or "roadeo." Results are recorded in a small folder and given to the driver, together with a handbook of road rules, for further study.

Upon completion of these three phases, the instructor reviews the results with the driver in private. Where deficiencies are noted, the driver is told how he can best correct them. For example, if it is found that a driver has slow reaction time, he will be shown how to compensate for this by allowing greater distance between vehicles in traffic and by exercising particular caution at intersections.

This program is offered to help the employee improve his driving in Company vehicles or in his personal car—to help make his life and that of others safer on the highway.

At the reaction timer, roustabout watches for signals to stop, turn, or start. Machine records his time to react to signals.

Distance judgment is measured by driver's ability to line up three miniature cars at a simulated distance of 20 feet.

Field of vision is checked by the instructor. Narrow vision requires driver to take special precautions at danger areas.

Glare-acuity device measures the ability of the driver's eyes to read a series of letters under both bright and dim lighting.

Driving skill is tested as the driver guides his truck through a narrow double row of flags in the obstacle course. This "behind-the-wheel" exam puts the driver through situations he might find on the highway, in city traffic, or in parking.

Graduate Studies on the Job

THE big problem in spanning the gap between education and industrial technology is how to bring the technical man and the college together. Graduate study is an ideal bridge, but few technical men can be spared from their work long enough to cross it for any length of time. Today's needs always look bigger than tomorrow's; there is little time for anything but specific and current projects. As a result, most technical people in industry are torn between the task at hand and the urgent need for raising their general level of scientific knowledge.

Humble has charted a course out of this dilemma for its Baytown Refinery technical people. It has arranged to bring the college to the man. The Humble Lectures in Science, soon to begin their fifth year at the refinery, make it possible for Baytown technical men to stay at home and take special graduate courses in the subjects they need most. The sustained program, which so far has brought a score of the nation's top scientists and educators to Baytown, includes four or five lectures a year.

The technical employees who take a course are relieved of all plant duties and devote full time to the lectures, which usually last about two weeks. It is an intensive two weeks' work; each course is about equivalent to a semester of university graduate study. There is a written examination at the end of each course.

Those who conduct the lectures are invited from among the most distinguished educators in America. One professor, an authority on the oxidation of organic compounds, came over from Leeds University (England) to take part in the series. They are all men whose work has made them honored and respected, in this country and abroad. Besides their affiliation with prominent professional societies in the United States, many of them

have been honored by the world's outstanding scientific societies. Their knowledge is not restricted to the theoretical side of science. By consulting with industry or by public service, they are equally well acquainted with the *practice* of science. A few are now high among the list of chemists and physicists working on atomic research.

When the lecture series was begun back in 1946, Humble was primarily interested in broadening the base and then raising the general level of scientific knowledge among its Baytown Refinery technical people. Specific and tangible benefits were anticipated, of course, but they came sooner and in a more direct manner than had been expected. Those responsible for refinery research and technical work are well pleased with the results thus far. *Almost half of the refinery's new research projects initiated during the past three years stem from the Humble Lectures in Science.*

That is significant. But even more significant is the enthusiasm generated among the technical men themselves. Hungry for new knowledge, they recognize the privilege and advantages of moving in such distinguished company. One chemist, who works with new projects concerned with refinery processes, made this observation:

"Perhaps 90 per cent of the information which comes to us in these lectures has been developed since 1935. Much of it is so new that it was not available in college *even a few years ago*. I needed a refresher course in organic chemistry. I got that, and all the new information as well."

Aside from the intellectual stimulation and the increased general knowledge that comes from attending the lectures, students are agreed on a number of immediate and practical benefits. High on that list is the fact that the lectures save time—and time can be precious to the technical man. Time is saved in two ways: First, the lectures have on occasion pointed out that some project already under way was leading up a blind alley. Second, by winnowing the chaff from the grain, lecturers often save researchers the long and arduous task of assembling and interpreting important data on some particular subject.

One young research man spoke for himself: "My job is looking for new and better catalysts that help with chemical reactions in refining processes. On many such projects, it takes a staggering amount of time and effort to get all the necessary facts and figures together before work can begin. It may take many months, even years. The help I got from one lecturer in this series has saved me years of rummaging through technical literature, assembling and interpreting all the scattered information on catalysis. That man—and he is tops in his field—opened many short cuts for me, and closed a great many side roads that I might have explored without result. Another thing I liked about him was this: He gave us his own approach to catalysis and those of two or three other authorities who did not necessarily agree with him. This gave us the chance to examine, openmindedly, a few of the most important theories, to interpret them, and to determine which features of each theory might be most useful to us."

A research supervisor made this potent point: "In industrial research there is usually so much emphasis on 'what can we do *now* to solve this *specific* problem?' This constant concern about the problems of the moment restricts the development of broad, useful knowledge. The courses have provided what we needed to renew our interest in basic, overall aspects of science."

All students are agreed on this: The lecturers do not fit the formal, stiffish impression that most people have of college professors, especially scientists. They are not aloof and coldly detached people. They are personable and approachable, and they can talk the layman's language as fluently as their own. At a course-end party to which students' wives were invited, one curious young lady was trying to find out more about the work that had kept her husband close to his books for two weeks. She had drawn the professor, an eminent authority on thermodynamics, to one side and was asking questions. The professor tried to explain his subject in simple words, but the word "entropy" did slip out.

Lecturers Who Have Appeared at Baytown

Name	Title	Subject of Lecture
Dr. R. T. Arnold	Professor of Chemistry, University of Minnesota	Advanced Topics in Organic Chemistry
Dr. P. D. Bartlett	Professor of Chemistry Harvard University	Theories of Organic Reactions
Dr. A. P. Colburn	Prof. of Chemical Engineering and Vice-Pres., University of Delaware. Now Acting President	Advanced Topics in Distillation
Dr. B. F. Dodge	Professor of Chemical Engineering, Yale University	Chemical Engineering Thermodynamics
Dr. H. Eyring	Prof. of Chemistry and Dean of the Graduate School, University of Utah	Catalysis
Dr. R. C. Fuson	Professor of Chemistry, University of Illinois	Advanced Hydrocarbon Chemistry
Dr. E. R. Gilliland	Professor of Chemical Engineering, Massachusetts Inst. of Technology	Transference of Processes from Small to Large Scale
Dr. J. H. Hildebrand	Former Dean of College of Letters and Sciences, Univ. of California	Thermodynamics of Nonelectrolytic Solutions
Dr. O. A. Hougen	Prof. of Chem. Engineering; Chmn., Department of Chem. Engineering, University of Wisconsin	Applied Kinetics
Dr. H. A. Laitinen	Professor of Chemistry, University of Illinois	Physical Chemical Problems of Analytical Chemistry
Dr. H. L. Lochte	Professor of Chemistry, University of Texas	Organic Chemistry
Dr. F. A. Matsen	Professor of Chemistry, University of Texas	Physical Chemistry
Dr. J. W. McBain	Emeritus Professor of Chemistry, Stanford University	Emulsions
Dr. R. L. Pigford	Prof. of Chemical Engineering; Chmn. of the Dept. of Chemical Engineering, University of Delaware	Mathematics of Chemistry and Chemical Engineering
Dr. K. S. Pitzer	Professor of Chemistry, University of California	Spectroscopy and Statistical Thermodynamics
Dr. C. C. Price	Prof. of Chem. and Head of Dept. of Chem., University of Notre Dame	High Polymer Chemistry
Dr. H. S. Taylor	Professor of Chemistry and Dean of Graduate School, Princeton Univ.	Adsorption and Surface Phenomena
Dr. A. D. Walsh	Lecturer in Chemistry, Leeds University, England	Oxidation of Organic Compounds
Dr. S. Winstein	Professor of Chemistry at U. C. L. A.	Mechanism of Organic Reactions

"There you go," she protested, "using words we wives don't know anything about."

"Ah, madam, but you *do* know about entropy," the professor replied. "Suppose, for example, that you left your three children at home by themselves for a couple of hours while you went shopping. When you returned, the condition of your living room would illustrate entropy. Entropy, you see, is a high state of *disorder*—molecular disorder in our case."

The professors themselves have this to say about the Humble Lectures in Science: They agree that contact between industry and education should be greater than it is now, but they point out the danger of *too close* contact. They contend, and rightly so, that the educator must remain free to carry on studies in pure science, tailoring what he learns to fit the problems of industry.

It is through contact of this sort that the professor learns what those problems are. He also learns about industry's accomplishments. It might be said that the professor helps with the first and benefits from the second, for the Lectures in Science are not a one-way street. The lecturers bring help for Baytown researchers and carry back to college classrooms a better idea of what students need to equip themselves for careers in industry.

Most of the professors are genuinely surprised to find Baytown people interested in other scientific fields besides their own. Student response and reaction are remarkably like that of any university graduate group, one educator declared. Subjects for the lectures are determined in large part by student demand at the refinery—which may account, in some measure, for the keen student interest.

Perhaps the most revealing of all student comments about the lectures came from the man who said: "It's like going to four or five of the best universities a year, without leaving home! If I were free to choose one school for graduate study, it would be a difficult choice. The best men in the subjects I need are scattered among a number of schools all over the country; it would take years to study under them all. This way, the Company brings those men here to me."

Practically everyone in the technical and research work at Baytown has had at least one course of lectures; some have had several courses. The list of subjects covered so far is enough in itself to awe the non-technical man. And sometimes the lectures carry even technical men into the stratosphere. Take, for example, that delightful abstraction—the *neutrino*.

The neutrino (which those who study nuclear physics use to make their equations come out right) cannot be called a *thing*. It can only be designated a *something*. It is difficult to define, for it has no mass and therefore no weight. It is not electrically charged, and cannot be seen or measured. Its only property, in fact, is its *spin*. Scientists know that a neutrino spins, and that's all they know about it. It would seem that the minds of research men must spin a little, too, as they grapple with something so nebulous as the neutrino!

Getting back to solid ground again, it is difficult to put down in plain black-and-white just what is going to come out of Baytown Refinery as a result of the lectures. That is understandable, and expected. Research men are reluctant to reveal their secrets, and they rarely say anything about a new project until its success is positively assured. But this much can definitely be said: Tomorrow's customers for fuels and lubricants are going to get more and better products for their money because these lectures are being held.

After all, that is the best possible measuring stick for determining the program's worth.

THEY HAVE RETIRED

SINCE the last report in these columns, 20 long-time Humble employees have retired, all but two of them with more than 20 years' service.

Humble Pipe Line Company—Raymond T. Elter, engineer at Viola, retired on February 22 after 15 years' service; Frederick J. Fowle, district gauger at Hull, on February 1 after 27 years' service; Clifford F. McMillan, engineer on Main Line "D", May Station on February 1 after 28 years' service; Coe McLeRoy, field dispatcher at Cisco, on March 5 after 26 years' service; John S. Olivier, T. & T. equipment foreman for Humble Pipe Line Company, on February 26 after 25 years' service; Clarence A. Shockley, engineer on Main Line "D" at Cisco, on February 17 after 20 years' service; Charles J. Tucker, engineer on Main Line "B" at Satsuma, on February 24 after 22 years' service; Thomas E. Counts, line rider or walker at Cisco, on February 10 after 26 years' service; and Dell M. Scaief, district gauger at Pampa, on February 25 after 22 years' service.

Mr. D. B. Harris accepts for the Company a scroll tendered by Marine Corps Maj. H. W. Edwards in appreciation of Humble's policy of granting military leaves of absence to Company people.

Production Department—Roland G. Hebert, Sr., rotary driller at Imogene, retired on February 2 after 19 years' service; Sam Matthews, pumper at Friendswood, on March 17 after 20 years' service; Thurman M. Rice, compressor plant operator and gauger at Luling, on February 1 after 24 years' service; Morris E. Standefer, district superintendent at Sugarland, on February 3 after 28 years' service; and Thomas J. West, watchman at London, on March 30 after 22 years' service.

Baytown Refinery—Manuel Balandran, laborer, retired on February 9 after 29 years' service; William Bouse, helper, on February 18 after 23 years' service; Michael J. Coady, stillman first class, on February 6 after 29 years' service; Jessie F. Rhodes, shop foreman, on February 28 after 23 years' service; and William C. Stegmiller, shift supervisor, on February 1 after 30 years' service.

Houston Office—Lulu Buckner, secretary, Petroleum Engineering Division, retired on March 20 after 21 years' service; and Gus Kellogg, superintendent, Claim and Rights-of-Way Department, Humble Pipe Line Company, on March 14 after 25 years' service.

Houston Bulk Station—John L. Hamblet, truck dispatcher, retired on March 18 after 25 years' service.

ANNUITANT GROUP LIFE INSURANCE PLAN REVISED

Humble's group life insurance program for annuitants has been revised effective March 1, 1950, to provide an additional option for employees who retire on or after that date. In general terms, this change allows an employee, effective the January 1 after he reaches age 65, to reduce his insurance to one-half and pay no premium, with the understanding that down through the years following retirement, his insurance may never be greater than one-half of the amount that would have been in force if he had subscribed for the greatest amount possible.

This revision does not alter the option in effect prior to March 1, 1950, under which employees (with certain limitations) may continue the full amount of insurance until the January 1 following age 65, and then have their coverage reduced by 5 per cent with similar reductions on each January 1 thereafter until the January 1 following age 74 when it will have been reduced to 50 per cent of the original amount. This 50 per cent amount will continue for the remainder of their life. Also, employees may continue to elect the other option in effect prior to this change and reduce their insurance to any amount that is a multiple of $500. The amount to which they subscribe, however, must not exceed at any time that which would have been in force if they had subscribed for the greatest amount possible.

Under the arrangements in effect before the recent Plan revision, the annuitant, effective the January 1 following age 65, pays a premium of $2.50 a month for each thousand dollars of coverage and the Company pays the difference between that amount and the actual cost (which may vary from year to year). Under the new option the entire cost of the reduced coverage will be paid by the Company. Under any of the options the annuitant pays the employee premium rate (presently 65 cents a month for each thousand dollars of insurance) until the January 1 following age 65.

By the way...

Shaggy buffalo still roam the range of the Yarbrough & Allen Ranch 10 miles east of Monahans, Texas, unconcerned by the drilling and production activities of the past three years. These five, part of the small herd kept on the ranch, obligingly posed near the Humble tank battery in background. (See "Spudding in," page 10)

The HUMBLE WAY

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Published every other month for employees and stockholders

HUMBLE OIL & REFINING COMPANY

P. O. Box 2180, Houston 1, Texas

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Deaths

Since the last issue of THE HUMBLE WAY, 16 active employees and six annuitants have died.

Active employees who have died are: JACOB C. BAKER, 39, roustabout at Friendswood, on February 20; WALTER M. BALLARD, 22, laborer at Baytown Refinery, on February 16; DANIEL B. BLAKE, 23, junior geologist in the Houston Office, on February 8; ROBERT L. BROWN, 43, carpenter at Friendswood, on February 21; WILLIE S. CONWAY, 57, helper second class at Baytown Refinery, on March 29; TOMMIE DAY, 55, operating chief engineer at Mt. Pleasant, on February 26; DEWEY C. DISHMAN, 51, farm boss at Lovell Lake, on January 29; LAWRENCE GOODMAN, 47, rotary driller at Stratton, on January 23; RICHARD HATHAWAY, 50, pumper and gauger at London, on March 10; J. D. HEDGE, 45, operator at the Acid Plant, Baytown Refinery, on February 23; ALLEN JACKSON, 25, helper at Baytown Refinery, on March 5; FRANK B. KELLEY, 50, assistant district superintendent, Operating Field, on March 29; ALLIE LITTLE, 47, pipe fitter first class at Baytown Refinery, on February 6; JAMES MITCHELL, 47, laborer at Baytown Refinery, on February 3; MARLIN J. SEXTON, 25, laborer, Geophysics-Louisiana, on March 25; and HONZIE T. WRIGHT, SR., 52, compressor plant operator and gauger at Luling, on March 28.

Annuitants: JOHN F. BENEDICT, 77, janitor at Cisco before his retirement, died on March 18; SCOTT Z. COLLINS, 80, pumper at Sour Lake before his retirement, died on March 13; LUTHER C. FOSTER, 60, division T. & T. inspector at Cisco before his retirement, died on January 18; LLOYD C. HARRISON, SR., 70, payroll clerk in the Houston Office before his retirement, died on March 9; HENRY W. STAPLES, 74, pumper and gauger at Conroe before his retirement, died on February 21; and GORDON G. WISE, 38, helper first class at Baytown Refinery before his retirement, died on February 24.

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Art Credits: Front cover, pages 13-16, by Avery Johnson; pages 16, 17, by E. M. Schiwetz; pages 24,25 by Harris Goode; page 7, Sauer Studio.

Pipeliners trudge uphill after a day's work. Pedernales River, in the Texas hill country, is neither wide nor deep, but piles of blasted rock (right) show it was a tough crossing job.

AMERICANS LIKE *Competition*

On sandlots or in Yankee Stadium, a close play at the plate brings fans roaring to their feet. "Hitting the dirt" sums up the spirit of competition in the Great American Game. Both teams play hard to win, within bounds of fair play and rules of the game. That is the kind of competition that gives fans their money's worth.

In business as in sports, competition gives Americans more for their money. In the oil industry, for example, each company competes with others for customers, just as every team in the league competes with others for the pennant. It is this competition that keeps companies on their toes and assures consumers a steady supply of quality products at reasonable prices.

In business or sports, competition is good for everyone.

HUMBLE OIL & REFINING COMPANY